Amendments to the Specification

Please replace the Abstract of Disclosure with the following text:

An oscillating ~~circuit~~ device to determine the purity of ~~singlr~~ single or multi-component liquids on the basis of their dielectric permittivity, in a continuous procedure through the frequency change in the static permittivity region and with strict temperature control. The oscillator is connected to a standard thermoregulated measuring cell, a frequency meter and a power source. The ~~excluding~~ improved characteristic is that the circuit does not contain the usual micrometric and standard capacitors and that it has a previously determined inductance to improve measurement conditions. In this manner, and operating in the region of static frequencies to avoid relaxation phenomena, a continuous measurement is achieved with a high degree of precision that had never been previously obtained. A measurement procedure is also disclosed that is carried out with said ~~circuit~~ device.

Please notice that in page 12 the following six new paragraphs are inserted after line 6 from the top and before line 4 from the bottom

Regarding the circuit, US 4,559,493 discloses an oscillating circuit for determining the purity of single or multi-component liquids (water and ink from static permittivities using a cell linked to a multimeter and a frequency meter but with no temperature control.

Material moisture detection through static dielectric measurements with a cell and an RLC oscillatoing circuit is [[also]] disclosed in US 4,782,282. Although exemplified for particulate solids the use in liquids is contemplated. However, again there is no reference to temperature control.

The choice of inductance values for the coil in the RLC oscillating circuit is [[also]] mentioned in US 3,319,209.

Somewhat similar is the circuit disclosed by US 3,793,585 for the continuous determination of single or multi-component liquids flowing through cell, through dielectric permittivity readings on a meter.

The same can be said of US 4,736,156 and 4,907,442 because they both refer to methods and systems for determining dielectric permittivity and capacitance to be used in the detection of moisture in liquids.

However, as already mentioned, none of the cited prior art indicates the need for an adequate and careful temperature control in the cell itself.

Please replace the fifteen paragraphs after line 4 in page 13 and before Section 4 in page 15 with the following fifteen amended paragraphs

The problem to solve is then to find a device comprising an oscillator that will allow to measure the capacitance of a capacitor, used as cell, through the changes in frequency of the oscillator, in the static permittivity region without the need of standard and micrometric capacitors and with a strict temperature control in the cell. This implies to work at frequencies low enough so as not to be affected by relaxation phenomena, so that with a careful temperture control the static permittivity of liquids csn be determined in an automatic fashion, with sufficient sensitivity to detect the presence of contaminants having permittivities similar to that of the fluid or that are in small proportions, if of higher ~~oermittivity~~ permittivity.

3. OBJECT OF THE INVENTION

Therefore, it is the object of this invention to provide a device comprising an RLC type circuit for the measurement of frequencies in the static region having an electronic oscillator connected to a carefully temperature controlled measuring cell through which a liquid flows, the permittivity of which is to be known.

Another object is to use a standard measuring cell without standard or micrometric capacitors with an adequate inductance and a monitored temperture control system.

Another object is to use a very stable oscillating circuit, the oscillating frequency of which can be held constant for sufficiently long periods of time so as to allow high precision measurements.

Another object is to use a rigid cell, of suitable dimensions, easy to connect and disconnect,. and with an adequate temperature control. based on the use of a thermistor placed in a well drilled into the measuring cell wall.

Another object is that the cell has a sufficient electric capacitance to make high sensitivity measurements possible.

Another object is that the temperature control depends on an adequate thermostatization and constant monitoring of the temperature.

Another object is to obtain a procedure to determine the permittivity of a liquid placed in a measuring cell from the electric capacitance values calculated from the frequencies measured on the oscillator.

Another object is to obtain the permittivity directly from the frequency values measured on the empty and filled cell, taking previously into account the frequency value corresponding to the residual capacitance.

As here above described, the oscillating device and the procedure of the present invention are centered in the electronic device to determine absolute dielectric permittivities in real time and in a continuous manner with a high degree of sensitivity and precision and also on the constant monitoring and control of the temperature in the measuring cell. To achieve this it is necessary to obtain an electronic circuit of great stability, that operates within the frequency range where no relaxation phenomena occur, that is to say below 1 MHz and preferably between 10 and 200 kHz and the frequency changes of which are sufficiently large so as to ensure an adequate sensitivity of the measurements.

Strict and careful temperature control in the measuring cell is needed in view of the substantial dependence of the permittivity of liquids on the temperature. So much so that the old term *dielectric constant* was abandoned because its lack of constancy with, among other variables, the temperature in the measuring cell.. As an example it may be cited that the permittivity of benzene changes by 0.002 units per degree centigrade [H. Bradford Thompson, Journal of Chemical Education, 43(2), 66-73 (1966)]. Therefore in order to obtain permittivity values with better than one 0.0001 units, necessary in precise control of the purity of liquids, a very strict control and temperture monitoring is necessary.

The invention will be better understood referring to the drawings, wherein:

Figure 1 shows the RLC oscillating circuit of the prior art used for static permittivity, wherein its capacitance is the result of three parallel capacitors: measuring cell, standard and micrometric capacitors [Review of Scientific Instruments, 65(4), 3067 (1996)].

Figure 2 shows the circuit of the present invention oscillator, that has no standard nor micrometric capacitors.

Figures 3 show different measuring cell structures: for plane parallel plates (A), for two coaxial cylinders (B) and three coaxial cylinders (C)

Figure 4 shows a layout of the connections between the different components used for the determination of the dielectric permittivity of a liquid.

Please replace paragraph in page 18 after line 18 with the following amended paragraph

Therefore to obtain the oscillator a printed circuit is built through customary techniques, as previously indicated, and the plate is placed in a metallic box with some insulating material on the walls, to avoid sudden temperature changes in the inside. An 8 V power source is needed, that for convenience can be place outside the box. This box has three connectors: two are BNC connectors, one for a rigid connection to the cell and the other to supply data to the frequency meter and the third is a simple connector that links the thermistor to the multimeter and thermoregulator.

Please replace in page 19 the equations before and after paragraph starting with the words "Wherein it can be seen..." and ending with the words "...generally used." with the following amended equations:

$$\varepsilon = \frac{\dfrac{1}{4\pi^2 f^2{}_f L} - \dfrac{1}{(\varepsilon_s - 1)}\left(\dfrac{\varepsilon_s}{4\pi^2 f^2{}_{es} L} - \dfrac{1}{4\pi^2 f^2{}_{fs} L}\right)}{\dfrac{1}{4\pi^2 f^2{}_e L} - \dfrac{1}{(\varepsilon_s - 1)}\left(\dfrac{\varepsilon_s}{4\pi^2 f^2{}_{es} L} - \dfrac{1}{4\pi^2 f^2{}_{fs} L}\right)}$$

$$\varepsilon = \frac{\dfrac{1}{f^2{}_f} - \dfrac{1}{(\varepsilon_s - 1)}\left(\dfrac{\varepsilon_s}{f^2{}_{es}} - \dfrac{1}{f^2{}_{fs}}\right)}{\dfrac{1}{f^2{}_e} - \dfrac{1}{(\varepsilon_s - 1)}\left(\dfrac{\varepsilon_s}{f^2{}_{es}} - \dfrac{1}{f^2{}_{fs}}\right)}$$

Please replace paragraph in page 20 after line 5 with the following amended paragraph

In the case of the planar capacitors, the most adequate geometry is that of a rectangle, while if cylindrical the components have to be coaxial. In both cases the separation between plates must not surpass 5 mm, because larger values lead to retention of air bubbles and also would lead to an increase in the overall measuring cell dimensions, in view of the large capacitance required for sensitive measurements. On the other hand the lower limit is 0.5 mm because otherwise the flow would be two slow. In the former case capacitance would decrease appreciably making it necessary to increase dimensions beyond what is reasonable and practical, while in the latter case there would be necessarily undesirable frictions.

Please replace the two paragraphs in pages 22 and 23, after the table in page 22 and in page 23 before the line starting with the words "The invention has been described..." with the following two amended paragraphs

In Figure 4 the placement of the measuring cell **1** can be seen in the flow diagram. This cell **1** is a two component cylindrical coaxial cell that is connected through a connection box **2** to the oscillator circuit **3**, indicating the measured value. The oscillator is in turn connected to a power source **4** and a frequency meter **5**. The connection box **2** communicates with a multimeter **6** for temperature reading and control, that together with the frequency meter **5** communicates with a computer **7** that determines, in a continuous fashion, automatically and in real time, the dielectric permittivity value of the liquid that flows through the parallel plates of the measuring cell **1** and controls the temperature, through readings by the multimeter **6**. Access of the fluid **8** to the measuring device is achieved through compressed air from a compressor **9**, that causes the liquid to enter. At the cell exit, the liquid continues to flow generating the air flow **10**. The whole measuring device is placed on a wooden frame **11** support. The cell temperature is controlled with a thermistor **12** placed in a well drilled in the wall of the measuring cell **1**, by reading with the multimeter **6** and

regulated by a themoregulating device **13** to which it is linked and connected to the computer **7** for monitoring and control.

The procedure to determine the static dielectric permittivity of a liquid of the present invention comprises the steps of:

- determining the value of the inductance needed for the circuit of the present invention so that it generates an oscillation frequency of values within the range of 50 and 200 kHz,
- determining section of the wires and the type of nucleus to be used in the inductance depending on the value found,
- determining the needed capacitance value for the measuring cell so that both empty and filled the circuit will oscillate within the desired frequency range,
- determining the residual capacitance of the device using a suitable standard liquid,
- adjusting the cell temperature through an appropriate thermoregulating system or measuring with a thermistor placed in the cell, the cell temperature both empty and filled,
- making the liquid flow through the cell,
- recording the cell temperature once it has reached thermal equilibrium, and keeping it steady through the thermoregulating device,
- recording the frequency values of the cell both empty and filled, through the computer connected frequency meter,
- establishing the permittivity value of the fluid in real time through computer calculations with a previously uploaded program, and
- comparing, with the uploaded program, the degree of coincidence of the determined permittivity with that expected that was previously stored.